Space Weather Forecast

Issued on Saturday, 31 December 2022 at 00:57 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of isolated G1/Minor Geomagnetic Storms initially day 1 (31st), Chance of further Moderate X-ray flares throughout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar Activity has been Moderate in the past 24 hours with two Moderate class flares, both originating from a moderately large and complex region in the northeast quadrant. There are currently 8 numbered active regions on the visible disc. Aside from the region mentioned above, the other most noteworthy regions are a recently numbered region which is still emerging around the northeast limb. This region gave a Moderate class flare on the UTC evening of 29th; a bi-polar region located in the northwest quadrant and which continues to show growth, but has been relatively inactive; and a region in the southeast quadrant, which is a moderately large bi-polar group showing some slight growth, again largely inactive at present.

Coronagraph imagery from STEREO-A imagery indicates a CME was associated with one of the Moderate flares (at 30/1528 UTC) from the active region in the northeast quadrant. Further imagery is awaited to analyse the CME and any potential Earth-directed component.

Solar Wind / Geomagnetic Activity: Solar winds were indicative of coronal hole connection, rising rather erratically through elevated levels to just peak at Strong for a time, before dropping back a little in recent hours. Total strength of the magnetic field was at mostly Moderate levels, but has also dropped to weak levels in recent hours.The north-south component was often negative and fluctuated with Moderate strength, before also becoming less disturbed in recent hours. Geomagnetic activity was mostly Active (Kp 4), with NOAA/SWPC and Potsdam recording a G1/Minor Storm interval 30/0000-0300 UTC.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) was at background with no solar radiation storms occurring.

Four-Day Space Weather Forecast Summary

Solar Activity: Low to Moderate activity is expected, with an ongoing daily chance of Moderate X-ray flares. There is a slight chance of Strong class flares occurring.

Solar Wind / Geomagnetic Activity: There are currently no Earth-directed CMEs expected to arrive during the forecast period. However, as mentioned in the Analysis section, further coronagraph imagery is awaited to analyse a CME that appeared to be associated with one of the Moderate flares from the active region in the northeast quadrant.

The ongoing coronal hole influence is expected to continue on day 1 (31st), before gradually declining days 2 and 3 (1st and 2nd), with good confidence for MOSWOC enlil expectations. No further coronal hole enhancements are expected during the forecast period.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

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Initially Unsettled to Active geomagnetic activity, with a chance of isolated G1/Minor Storm intervals, are expected to gradually ease to be Quiet to Unsettled, with a chance of Active period by day 2 (1st) and mainly Quiet with isolated Unsettled intervals day 3 (2nd).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is forecast to remain at background with no solar radiation storms occurring. However, there is a slight chance of these rising in response to any larger flares that may occur, and perhaps exceeding the S1/Minor Radiation storm level.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	30	5	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	50	50	50	50
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	5	5	5
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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